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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/500,985	10/15/2004	Anders Heyden	CU-3772 RJS	1863

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LADAS & PARRY LLP
224 SOUTH MICHIGAN AVENUE
SUITE 1600
CHICAGO, IL 60604

EXAMINER	
LEE, JOHN W	

ART UNIT	PAPER NUMBER
2624	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/500,985	HEYDEN ET AL.	
	Examiner	Art Unit	
	John Wahnkyo Lee	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 October 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 July 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *20040902*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. An initialed and dated copy of Applicant's IDS form 1449, Paper No. 20040902, is attached to the instant Office action.

Claim Objections

2. Claim 13 is objected to under 37 CFR 1.75 as being a substantial duplicate of claim 11. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 8 and 9 recite the limitation "said array" and claims 11 and 13-14 recite the limitation "transforming the coordinate data." There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-10 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nguyen et al. (WO 01/07920) in view of Josso et al. ("Automatic 2-D Get Registration Using Distance Minimisation of Image Morphing).

Regarding claim 1, Nguyen discloses a method for the detection and quantification of proteins in a plurality of samples comprising:
(a) combining each of said samples with a plurality of marker proteins each having a known identity and known characteristics that affect its migration in two-dimensional electrophoresis, said marker proteins each being labeled in a manner that is distinguishable from said sample proteins; (b) performing two-dimensional electrophoresis on said samples thus combined with said marker proteins to form a two-dimensional array of protein spots for each sample, each said array including marker protein spots corresponding to said marker proteins and sample protein spots corresponding to said sample proteins; (c) scanning each array to form a first image of signals corresponding to said marker protein spots and a second image of signals corresponding to said sample protein spots, the signals of said first image distinguishable from those of said first image; and (d) processing said first and second images together for each of said, arrays, using said marker protein spots to automatically match corresponding sample protein spots among individual arrays (claim 1). However, Nguyen does not disclose the last two detail claim limitations of claim 1, but Josso does. Josso teaches an image morphing, that is a continuous series of spatial

transformation defined by a displacement field (page 357, section 2), by disclosing mathematical equations denoted as phase 1 and phase 2 (page 358, section 2.1-2.2). From the first phase and the second phase, the overlap is achieved and fined tuned (page 358, section 2.2).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to use Josso's method in Nguyen's automated landmarking for two-dimensional electrophoresis to provide a technique that biomedical image can benefit from as suggested by Josso (abstract).

Regarding claims 2 and 3, Nguyen further discloses that marker proteins, that serves as landmarks (page 5, lines 23-24), will be governed by particular separation parameters such as molecular weight, isoelectric point, and a combination of both (page 5, lines 13-19).

Regarding claims 4-5 and 10, Josso further teaches an algorithm that minimizes the Euclidean distance between the two images because of the change of the distance between two images from the warping process (page 357, section 2). The process is stopped when a predefined minimum distance is reached, which can read on the "ideal position" of the claims. Josso also teaches an image morphing that is a continuous series of warps defined by a displacement field (page 357, section 2). It is well known from the ordinary skill in the arts that displacement is a vector that specifies the position of a point in a particle.

Regarding claim 6, Josso further discloses that a set of 2-D PAGE gels that is used in Josso's method relies on detecting differences in protein spots both qualitatively and quantitatively (page 357, section 1). It is readily apparent that without being acquirable, detecting the difference of the spots of the proteins cannot be collected qualitatively and quantitatively.

Regarding claims 7-9, Josso further discloses detecting the protein spots (page 357, section 1) and using points to implement an image morphing that is a continuous series of warps defined by a displacement field (page 357, section 2) by disclosing mathematical equations denoted as phase 1 and phase 2 (page 358, section 2.1-2.2). After one of the images is warped, the change of the distance can control the morph (page 357, section 2).

Regarding claim 10, Josso further discloses that the change of the distance can control the morph (page 357, section 2) and the displacement of any pixels between two consecutive frames is a morphing sequence that should not be greater than a distance Є (pages 357-358, section 2).

Regarding claim 15, Nguyen further discloses scanning each array to form a first image of signals corresponding to said marker protein spots and a second image of signals corresponding to said sample protein spots, the signals of said first image distinguishable from those of said first image

7. Claims 11-14 and 17-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nguyen et al. (WO 01/07920) in view of Josso et al. ("Automatic 2-D

Get Registration Using Distance Minimisation of Image Morphing), and further in view of Sammons at al. (US 5,073,963).

Regarding claim 11, Nguyen and Josso disclose and teach all the pervious claim limitations and scanning each array to form a first image of signals corresponding to said marker protein spots and a second image of signals corresponding to said sample protein spots, the signals of said first image distinguishable from those of said first image, but not the detail claim limitation of claim 11. Sammons discloses that the spot data includes the spot's identification, gel name, and x-y coordinate values (col. 7, lines 24-25), the gel images are 1024X1024 pixel array (fig. 6a-6c; col. 7, lines 35-37), and the adjust operation has two-stage coordinate transformation- the first and second transformation. The first transformation transforms the positional coordinates of the set of reference mark and the unknown reference marker spot member from the original scan coordinate system to a new reference coordinate system (col. 8, lines 35-42). The second transformation comprises determining the pair relationship between a particular study marker spot member and a particular unknown study spot member, determining positional coordinate by a sift amount and movement values, and a repeating process of the pairing and the determination of the new coordinate location (col. 8, lines 51-68; col. 9, lines 1-19).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to use Josso's method and Sammons's method in Nguyen's automated landmarking for two-dimensional electrophoresis to make is able for the user to manipulate the various data resulting from the operation of subroutines

for verifying the results as well as analyzing the data from different perspectives as suggested by Sammons.

Regarding claim 12, Sammons further disclose a second transformation that finds the nearest and second nearest markers to the unknown study spot (col. 8, lines 65-66).

Regarding claims 13 and 14, Sammons further discloses that the spot data includes the spot's identification, gel name, and x-y coordinate values (col. 7, lines 24-25), the gel images are 1024X1024 pixel array (fig. 6a-6c; col. 7, lines 35-37), and the adjust operation has two-stage coordinate transformation- the first and second transformation. The first transformation transforms the positional coordinates of the set of reference mark and the unknown reference marker spot member from the original scan coordinate system to a new reference coordinate system (col. 8, lines 35-42). The second transformation comprises determining the pair relationship between a particular study marker spot member and a particular unknown study spot member, determining positional coordinate by a sift amount and movement values, and a repeating process of the pairing and the determination of the new coordinate location (col. 8, lines 51-68; col. 9, lines 1-19).

Regarding claims 17-22, Sammons further discloses scanning, identifying, and designating 2-D patterns of the reference marker and the study marker (claim 1). The first and second transformation transforms the positional coordinates (claim 1) of the spot data including the spot's identification, gel name, x-y coordinate values, integrated

intensity, and elements that can determine a shape such as a spot area, a spot height, and a spot width (col. 7, lines 24-25).

8. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nguyen et al. (WO 01/07920) in view of Josso et al. ("Automatic 2-D Get Registration Using Distance Minimisation of Image Morphing), and further in view of Sammons at al. (US 5,073,963) and Sloge et al. (US 7,155,050).

Regarding claim 16, Nguyen, Josso, and Sammons disclose and teach scanning each array to form a first image of signals corresponding to said marker protein spots and a second image of signals corresponding to said sample protein spots, the signals of said first image distinguishable from those of said first image, and the first and second transformation transforming the positional coordinates of the spot data including the spot's identification, gel name, x-y coordinate values, integrated intensity, and elements that can determine a shape such as a spot area, a spot height, and a spot width, but not in three dimensional. However, Slodge discloses a 3D map, that is a 3D representation of the pixel intensity values of an electronic image of an electrophoresed cell sample, illustrated as 3D spot view (fig. 5; col. 8, lines 6-10).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to use Josso's method, Sammons's method, and Slodge's method in Nguyen's automated landmarking for two-dimensional electrophoresis to make is able for the user to provide higher accuracy as suggested by Slodge (col. 3, lines 29-30).

Conclusion

9. No claims are allowed.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Wahnkyo Lee whose telephone number is (571) 272-9554. The examiner can normally be reached on Monday - Friday (Alt.) 7:30 a.m. - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu can be reached on (571) 272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

John W. Lee

JINGGE WU
SUPERVISORY PATENT EXAMINER